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Is There a Correlation Between Frailty, Comorbidities, And Poorer Outcomes, Including Mortality, During Hospitalisation?

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Abstract: ***Background:*** Frailty is commonly described as a syndrome associated with the ageing process, where there is a significant decline in physiological function and a heightened susceptibility to negative health outcomes. Elderly patients who are frail often experience a higher level of symptoms such as weakness and fatigue, have more complex medical conditions, and have a reduced ability to tolerate medical and surgical treatments. Enhancing understanding of frailty and its related hazards for unfavourable health consequences can enhance the provision of care for this highly susceptible group of patients. The burden of comorbidity is a term used to describe the combined presence of multiple illnesses or diseases. It is also used to indicate the overall impact of these conditions, which includes both physiological and psychological dysfunctions. ***Aims:*** The objective of this study is to investigate the statistical significance of two factors, namely the frailty of admitted patients as evaluated by geriatricians using the Clinical Frailty Scale (CFS), and the burden of comorbidities in patients as assessed by the Age Adjusted Charlson Comorbidity Index (AACCP), on various negative outcomes of interest. These outcomes include longer than expected hospital stays, the need for oxygen therapy, transfer to advanced care departments, and the occurrence of hemodynamic, organ, or electrolyte dysfunctions. ***Methods:*** This study will be conducted at the King Hussein Medical Centre at the Royal Medical Services in Amman, Jordan. It will focus on medically admitted patients in the medical departments. The study will be a retrospective observational design and will cover the period from 2003 to May 2024. This study will include patients who have known frailty and comorbidity scoring at the time of admission. Patients who were admitted for observation or had admission durations of less than 2 days will be excluded from our study. We will investigate both the GFS and AACCI for their regression associations with the likelihood of experiencing poorer outcomes during the admission period. In this study, we utilised receiver operating characteristic, sensitivity analyses, and binary logistic regression test for statistical analysis. The Chi-square test will be employed to assess the distribution rates and the unadjusted estimated risk between the group with better outcomes and the group with poorer outcomes.

Keywords: geriatrician trained in scoring (CFS), age adjusted charlson comorbidity index, poorer outcomes of interest, medically admitted patients.

INTRODUCTION

As the global population ages, it becomes increasingly complex to make decisions about the treatment of age-related disorders or disabilities for individuals aged 65 and above. Chronological age alone is not a reliable indicator of their physiological and functional status. Geriatric assessments provide a comprehensive understanding of an older person's age, considering physical function, cognition, nutrition, comorbidities, psychological status, and social support. This approach helps clinicians assess treatment risks and benefits, promoting shared decision-making and personalised care for older patients. The use of geriatric assessments in geriatric care can help improve shared decision-making and personalised care.

The ageing process commonly describes frailty as a syndrome characterised by a significant decline in physiological function and a heightened susceptibility to negative health outcomes. Elderly patients who are frail often experience a higher level of symptoms, such as weakness and fatigue, more complex medical conditions, and a reduced ability to tolerate medical and surgical treatments.

It is a result of cumulative cellular damage from diverse aetiologies over an individual's life, leading to a loss of homeostatic reserve in physiological systems. Risk factors for frailty include socio-demographic influences, psychological factors, nutritional issues, polypharmacy, diseases and complications, and low physical activity. Factors such as depression, malnutrition, polypharmacy, diseases and complications, and low physical activity can all contribute to frailty.

The term "burden of comorbidity" refers to the combined presence of multiple illnesses or diseases. The term also denotes the comprehensive influence of these conditions, encompassing both physiological and psychological dysfunctions. All adults experience longer hospital stays, higher medical costs, and more readmissions due to medical and psychiatric comorbidity. Depression, in particular, extends the stay by 4-5 days.

Elderly patients with cancer often have a high burden of chronic diseases, making optimal treatment difficult. The ACCI plays a crucial role in treatment selection, response to therapy, tumour progression, morbidity, and survival outcomes cancer have reported it as a prognostic factor.

The goal of this study is to find out how statistically significant three separate age-related factors are: the frailty of admitted patients, which is measured by geriatricians using the Clinical Frailty Scale (CFS) and the burden of comorbidities in patients, which is measured by the Age Adjusted Charlson Comorbidity Index (AACCP) on a poorer outcomes of interest propensity.

METHODS

The King Hussein Medical Centre at the Royal Medical Services in Amman, Jordan, conducted this study. It will focus on 641 medically admitted geriatric patients aged between 65 and 85 years in the medical departments. The study was a retrospective observational design that covered patients from January 2023 to May 2024. This study included patients whose frailty and comorbidity scores, as manifested by the Clinical Frailty Scale (CFS) and age-adjusted Charlson Comorbidity Index (AACCI), respectively, were electronically or paper-based and documented in the tested patient's admission notes. We excluded patients admitted for observation or with admission durations less than 2 days from our study. The study also considered missing data from patients exceeding 20% as an exclusion criterion. We excluded patients aged 65 years or older from this study. Also, in this study, we excluded patients completely dependent on personal care and approaching end-of-life or terminally ill patients with a life expectancy of under six months who are not otherwise living with severe frailty. Numerically, these excluded frail patients belonged to CFS categories VIII-IX. Our Jordanian Institutional Review Board (J-IRB) at the RMS approved this study on 11 August 2024 under the registration number 8_12/2024.

The main idea that this study was based on showed that admittedly frail medical patients based on their CFS values were better at predicting negative outcomes of interest (cOI) than patients with more than one illness or just their chronological age. The adverse outcomes that were tracked included staying longer than expected in the hospital, needing oxygen therapy, transferring to advanced care departments, experiencing hemodynamic, organ, or electrolyte dysfunctions, and mortality.

In this study, we first dichotomised the cOI into either a negative state or better outcomes (State I) or a positive state or poorer outcomes (State II). We first expressed the proportionality of each variable and the allocation number. The variables tested for the patients include their genders, age scales and categories, AACCI scales and categories, CFS categories, and each patient's socioeconomic and food/spicy categories. We adopted the chi square test for statistical analysis of comparisons across the dichotomised cOI states. We also abstracted the odd ratio and p-values while conducting the chi square tests. Subsequently, we conducted individual serial receiver operating characteristic, binary logistic regression, and sensitivity analyses for each patient's AACCI and CPS, assessing the likelihood of poorer cOI rather than better cOI during admission days.

We collected and analysed patients' retrievable data using Excel version 20 from Microsoft Corporation and SPSS version 25 from IBM Corporation, respectively.

RESULTS

The overall admitted geriatric patients that were investigated in this observational retrospective study was 641. Approximately 49.29% (316 patients) had a negative state or better OI (cOI State I) and approximately 50.70% (325 patients) had a positive state or poorer OI (cOI state II). In this study we expressed that there were statistically insignificant distribution rates across the two compared cOI states. Also,

Table 1: Patients' Comparative Tested Variables across cOI State I and cOI State II.

	Negative State Better OI cOI State I (316, 49.29%)	**Positive State Poorer OI cOI State II (325, 50.70%)**	**Overall 641**	**OD**	**R**	**P-Value**
Gender						
F	163 (51.6%)	155 (47.7%)	318 (49.6%)	1.168 (95% CI; 0.857-1.593)	0.039±0.039	0.325
M	153 (48.4%)	170 (52.3%)	323 (50.4%)			
Age (Years)						
<75	143 (45.3%)	138 (42.5%)	281 (43.8%)	1.120 (95% CI; 0.820-1.530)	0.028±0.039	0.476
≥75	173 (54.7%)	187 (57.5%)	360 (56.2%)			
AACCI						
<7	156 (49.4%)	45 (13.8%)	201 (31.4%)	6.067 (95% CI; 4.131-8.910)	0.383±0.035	0.753
≥7	160 (50.6%)	280 (86.2%)	440 (68.6%)			
CFS						
<5	156 (49.4%)	18 (5.5%)	174 (27.1%)	16.629 (95% CI; 9.847-28.082)	0.493±0.030	0.000
≥5	160 (50.6%)	307 (94.5%)	467 (72.9%)			
SEC						
Lower	107 (33.9%)	101 (31.1%)	208 (32.4%)	NA	0.014±0.040	0.629
Standard	105 (33.2%)	119 (36.6%)	224 (34.9%)			
Higher	104 (32.9%)	105 (32.3%)	209 (32.6%)			

DISCUSSION

Frailty independently predicts hospital stay and mortality after discharge. Comorbidities are a good frailty surrogate. Future categorical frailty studies should examine this correlation and its relationship to institutionalisation or emergent medical need. Frail, vulnerable adults are hospitalised more often, and healthcare is expensive. Thus, identifying patients at highest risk for frail-vulnerable states and poor outcomes is becoming more important.

The Charlson Comorbidity Index (CCI) assesses patient variables predictive of poor outcomes without the time required for categorical assessment. CCI is supported as a reliable method for assessing frailty or as a potential outcome predictor in categorical frailty studies.

Frailty and comorbidities often coexist and affect inpatient outcomes. Multiple health conditions increase morbidity, complications, hospital stays, and healthcare resource use. Both surgical and medical patients with comorbidities ('multimorbidity') have higher in-hospital mortality. Urgent surgery patients' inpatient and 30-day outcomes are predicted by the Elixhauser Comorbidity Index. The Palliative Performance Scale (PPS) and Charlson Comorbidity Index (CCI) have been used to assess hospital inpatient comorbidities and functional status.

Frailty is also associated with longer, higher in-hospital mortality, patient morbidity, mortality, readmission, adverse functional outcomes, and post-discharge institutionalisation. Healthcare professionals must consider the patient's recent care, the chronic conditions' short- and medium-term prognoses, and frailty's increased vulnerability when setting rehabilitation goals. Frail patients have limited reaction reserves, so proactive strategies to prevent decline include appropriate rehabilitation, medication minimisation, and annual medication review.

Frailty and comorbidities in hospitalised patients should be managed by focussing on the comorbidities that cause worse outcomes. Recent research suggests that frailty and comorbidities independently affect outcome. Future studies should examine the relationships between frailty, comorbidities, and poor hospital outcomes to find effective strategies for high-risk patients.

Strategies should focus on coping with comorbidities in hospitalised patients, especially when involving long-term medication use adjustments; multidisciplinary care (including rehabilitation) when recovery is expected; and a personalised treatment plan for those with limited recovery possibilities (goal advance care and return home safely), in this case earlier palliative care. This personal perspective requires special care and sacrifices for the frail older person. Holistic and patient-centered hospital care is high-quality, but it also has challenges.Frailty's multidimensionality and growing burden on healthcare systems make it a global concern for healthcare systems. Clinicians can assess frailty using the well-validated Clinical Frailty Scale.

The study examines how frailty—CFS >5 and CCI—affects in-hospital mortality.

Numerous frailty scores combine multiple manifestations. Performing daily tasks independently is one focus. Unintentional weight loss or self-reported exhaustion are other measures. The Clinical Frailty Scale (CFS) is among the most popular, validated, and used scores. Evaluation of function, including mobility and ADLs, is heavily weighted. It helps providers identify frail patients at risk for adverse outcomes and implement timely preventive strategies to improve patient outcomes. Critics of the CFS say its heavy focus on patient function can lead to a “ableism” bias. This bias may affect the Clinical Frailty Scale's allocation of ICU resources.

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